

REMARKS

Claims 1-20 remain in this application, and claims 1-20 have been rejected. Claims 1, 15, and 17 have been amended.

Claims 1-4 and 9-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Number 6,341,066 ("Murowaki") in combination with U.S. Patent Number 5,646,802 ("Akiyama"). Claims 1, 15, and 17 are the only independent claims. Claims 5 and 7 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Murowaki in combination with Akiyama, and further in combination with U.S. Patent Number 5,834,934. Claim 6 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Murowaki in combination with Kinoshita, and further in combination with U.S. Patent Number 5,528,093. Claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Murowaki in combination with Akiyama, and further in combination with U.S. Patent Number 5,707,249.

MUROWAKI DOES NOT TEACH OR SUGGEST AN ELECTRICAL DEVICE HAVING "AT LEAST ONE HEAT- GENERATING ELECTRICAL COMPONENT MOUNTED ON AN OUTSIDE SURFACE OF" A FLEXIBLE PRINTED CIRCUIT BOARD

The independent claims have been amended to further clarify that the heat-generating electrical component is mounted on the outside surface of a flexible printed circuit board. Thus, each one of independent claims 1, 15, and 17, as amended, is limited to an electrical device having "at least one heat-generating electrical component mounted on an outside surface of" a flexible printed circuit board. Murowaki does not teach or suggest this limitation.

The Examiner generally alleges that Murowaki discloses in figure 2A, column 5, lines 40-49 a printed circuit board "having at least one heat generating electrical component (5) mounted on the outside surface (11) thereof." Then, in the "Response to Arguments" section, the Examiner simply reiterates the above-stated allegation: "Murowaki et al. shows 'at least one heat-generating electrical component (unit 5a) mounted on the outside surface (unit 11) thereof.' (see figure 2A, column 4, lines 1-2 and lines 47-48)."

Referring to Murowaki, the actual text of the above-citations is reproduced below:

The electronic control unit 1 has a connector 2, a control processing element 3 and drive elements 5 (5a, 5b). (column 3, line 67 – column 4, line 2).

The connector 2 and the control processing element 3 are provided on the back side face (*i.e.*, the upper face) of the face (in FIG. 2A, the lower face) of the control circuit board 9 facing the drive circuit board 11. (column 4, lines 45-48).

The control circuit board 9 on which is formed the control circuit comprising the control processing element 3 and the drive circuit board 11 on which is formed the drive circuit comprising the drive elements 5 are electrically connected to each other by a flexible printed circuit board (flexible board) 13 as a connecting wire. The flexible board 13 has excellent elasticity and is soldered to end parts of the control circuit board 9 and the drive circuit board 11 to be electrically connected to the interconnection patterns on the boards 9, 11. (column 5, lines 40-49) (emphasis added).

It seems that the Examiner is confusing the drive circuit board 11 with the flexible board 13. According to the cited text and FIG. 2A, as acknowledged by the Examiner, the electrical component 5a is mounted on the drive circuit board 11 – not on any surface of the flexible board 13. The flexible board 13, which is a “flexible” component, is a separate and distinct component from the drive circuit board 11, which is a rigid component.

Further, nowhere else does Murowaki disclose the claimed limitation. None of the figures of Murowaki show any components (whether heat generating electrical components or otherwise) that are mounted on the outside surface (or any other surface) of any of the two disclosed flexible printed circuit boards 13, 14. The specification makes it clear that electronic components are “mounted on [a] control circuit board 9” (col. 4, ll. 23-27), that “drive elements 5 also are provided . . . but are mounted on a separate board (the drive circuit board 11) from the control circuit board 9.” (col. 4, ll. 64-66) (emphasis added). Similarly, the specification makes it clear that “electronic components including the drive element 5a are mounted on the drive circuit board 11 to form a predetermined drive circuit” (col. 7, ll. 32-34). Thus, it is clear that elements 5 are not mounted on the outside surface of the flexible circuit boards 13, 14.

The present invention acknowledges in the “Background of the Invention” section that prior art such as Murowaki exists, noting that prior art “control circuits are typically mounted on rigid circuit boards.” (emphasis added). However, this type of “arrangement can create

problems,” such as increasing the space necessary for the components and decreasing the dissipation of generated heat. The present invention provides a solution to the problems associated with the mounting of electronic components on rigid circuit boards.

Thus, Murowaki fails to disclose at least one claim limitation, as described above. Thus, Applicants respectfully submit that claims 1, 15, and 17, as well as all the claims dependent thereon, are allowable for at least the above-stated applicable reasons.

**NONE OF THE CITED REFERENCES TEACH OR SUGGEST A
FLEXIBLE PRINTED CIRCUIT BOARD “ATTACHED
DIRECTLY TO AN EXTERIOR SURFACE” OF A HOUSING**

The independent claims have been amended to clarify that the flexible circuit board is “attached directly” to an exterior surface of a housing. Acknowledging that Murowaki “fails to disclose a flexible printed circuit board attached to at least a portion of the exterior of the housing,” the Examiner alleges, however, that the limitation is disclosed by Akiyama. Specifically, the Examiner alleges that Akiyama discloses “a flexible printed circuit board (11) attached to at least a portion (printed circuit board 3) of the exterior of the housing (2).”

Although Akiyama shows a flexible circuit board 11 that is indirectly attached to a base plate 4, Akiyama does not teach or suggest attaching the flexible circuit board 11 directly to an exterior surface of a housing. Thus, the teaching of Akiyama is different from the present invention because 1) the flexible circuit board 11 is indirectly attached, and 2) the flexible circuit board 11 is not attached to a housing, which partially encloses an electrical apparatus or electro-mechanical device.

First, the flexible circuit board 11 is attached indirectly to the base plate 4. In contrast, claims 1, 15, and 17, as currently amended, are limited to a flexible circuit board that is directly attached to an exterior surface of a housing. One of the objectives for using the flexible circuit board of the current invention is to have “heat generated upon operation of said electrical component [] transferred to said housing and dissipated therefrom into the surroundings.” Thus, heat dissipation is greatly improved in the present invention because the housing acts as a heat sink that naturally dissipates heat generated by any electrical components mounted on the flexible circuit board. The base plate 4 of Akiyama cannot successfully function as a heat sink because the flexible circuit board 11 is not directly attached to an exterior surface of the base plate 4.

Second, the base plate 4 is not a housing as claimed by the present invention. Each one of claims 1, 15, and 17 has been amended to further clarify that an apparatus or device that is positioned within a housing is partially enclosed by the housing. Accordingly, the claimed invention is limited to a housing that partially encloses an electrical apparatus or electro-mechanical device. For example, claim 1 is limited to “an electrical apparatus positioned within said housing, said housing partially enclosing said electrical apparatus,” claim 15 is limited to “providing an electrical apparatus within said housing, said housing partially enclosing said electrical apparatus,” and claim 17 is limited to “an electro-mechanical device positioned within said housing, said housing partially enclosing said electro-mechanical device.” Nowhere does Akiyama show an electrical apparatus or an electro-mechanical device being positioned within the base plate 4.

Thus, Applicants respectfully submit that claims 1, 15, and 17, and all claims dependent thereon, are allowable for at least the above-stated applicable reasons.

AKIYAMA IS NONANALOGOUS ART

To rely on a reference under § 103, the reference must be analogous prior art. MPEP, § 2141.01(a), p. 2100-117. “In order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.” *In re Oetiker*, 977 F.2d 1443, 1446.

Claims 1, 15, and 17 are each directed to an electrical device “whereby heat generated upon operation of [] electrical components is transferred to [a] housing and dissipated therefrom into the surroundings.” Akiyama has nothing to do with heat dissipation. Rather, Akiyama is directed to reducing the height of a disk drive.

The Federal Circuit has indicated that a reference is not analogous simply because the reference has an element in common with the claimed invention. For example, the Federal Circuit has found that a reference related to single in-line memory modules (“SIMMs”) for an industrial controller was nonanalogous art to a patent application related to SIMMs for installation on a printed circuit motherboard for use in personal computers. *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858 (Fed. Cir. 1993). Even though the reference and the claims at issue were both related to memories, the reference was found to be nonanalogous because the reference

was directed to modules of varying sizes, wherein the claimed invention was directed to compact modular memories. Similarly, in our case the only thing that Akiyama appears to have in common with the claimed invention is that it discloses a “flexible printed circuit.” A skilled artisan seeking to solve a problem associated with heat dissipation in an electrical device, would not look at Akiyama for a solution. Thus, Akiyama is nonanalogous art.

Accordingly, Applicants respectfully submit that claims 1-4 and 9-20 are not obvious in view of Akiyama for the above-described applicable reasons.

**THERE IS NO SUGGESTION OR MOTIVATION TO COMBINE
MUROWAKI AND AKIYAMA**

There is no suggestion or motivation to combine the teaching of Murowaki, which is directed to suppressing heat generated by a drive element in an electronic control unit, with the teaching of Akiyama, which is directed to a disk drive of reduced height. While Murowaki is focused on problems associated with heat generation of electronic components, Akiyama is focused on problems associated with reducing the size of a disk drive.

For example, referring to an electronic control unit having a control processing element and a number of drive elements, Murowaki notes that

the control processing element 103, which performs various computational processing, readily suffers influences of heat, and consequently there is a possibility of heat produced by the drive elements 105 excessively raising the temperature of the control processing element 103 and making its operation unstable.

Column 1, lines 44-50. In contrast, Akiyama notes that “[t]he advent of portable computer systems has placed a premium on providing disk drives of even more reduces size and weight.”

Column 1, lines 20-22. Further, Akiyama emphasizes that “[o]f importance in achieving a reduced height dimension is the height of the components contained within the disk drive housing.” Column 2, lines 14-16.

Clearly, one of skill in the art would not be motivated to combine a reference directed to solving problems associated with heat generation with a reference directed to solving problems associated with size reduction. Thus, Applicants respectfully submit that claims 1-4 and 9-20 are not obvious over Murowaki in view of Akiyama for the above-described applicable reasons.

Conclusion

Reconsideration of this application in light of the foregoing remarks is respectfully requested.

It is believed that no fee is presently due; however, should any additional fees be required (except for payment of the issue fee), the Commissioner is authorized to deduct the fees from Jenkins & Gilchrist, P.C. Deposit Account No. 10-0447, Order No. 47181-00252.

Respectfully submitted,

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